

Revision of Industrial Engineering MSc Innovation Management

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8 January 2015 (course codes updated 27 May 2015)

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Preface

This document contains the revision of the IE Master Innovation Management which is in full accordance with the Guidelines for Revision of TU/e Graduate School Master's Programs (2014). This revision has been developed by the IM Program Committee; it has been discussed with IM lecturers, and was accepted by all participating IE Capacity Groups; it has been approved by the Graduate Program Director IE, and was honoured with a positive advise from the IE Curriculum Committee. The restricted specialization electives were approved by the Departmental Board of IE&IS, as required. The Revised IE Master IM was sent to the Dean of the Graduate School in due time, for final approvement.

Introduction

Based on the Guidelines for Revision of TU/e Graduate School Master's Programs (2014), the Program Committee Innovation Management (PC-IM) has developed a revision of the Industrial Engineering (IE) Master of Science Innovation Management (IM).

Design Choices

Before the revised program will be presented, the underlying design choices will be articulated. These choices were made at two levels: I) At the level of the Graduate Program Industrial Engineering (GP-IE) - which contains two master programs: Operations Management and Logistics (OML), and Innovation Management (IM); and II) At the level of the IM master program itself.

Ad I: General Design Choices at GP-IE Level¹

At GP-IE level the following three design choices have been developed by both the PC-IM and PC-OML, and those general IE design choices were approved by the Program Director GP-IE at that time (Van Houtum, 2014). This concluded the rough design phase of both IE master programs OML and IM, at the end of August 2014. These choices are as follows:

General IE Design Choice 1

The revision will be such that each student can do all his/ her core courses and specialization electives in the first year. This holds for both students starting in September and students starting in February.

Motivation for General IE Design Choice 1

For the majority of the IM students, the 'International dimension' will consist of doing courses at a foreign university during two quarters (one semester). That can take place during the first half of the second year. The second half of the second year is needed for the master thesis work.

Consequences of General IE Design Choice 1

The standard size of the master thesis work will be 30 ects (including the research proposal). It is still possible to define a separate literature study of 5 ects, which a student can do while being abroad. In that case, there are two possibilities. We can make the literature study compulsory, or we define the literature study as an elective 'course'.

For students in the 'honours track in research', one can opt for an alternative interpretation of the international dimension (e.g., a visit at a related research group in a foreign country) and master thesis work (i.e., 45 ects, and focused on research).

General IE Design Choice 2

We define tracks, that consists of: Courses that belong together; Master thesis subjects for which those courses are relevant. Core courses and specialization electives can be defined per track.² A particular core course may be a core course for all tracks, but one may also have courses that are only compulsory for one or a few tracks.

A track should be defined such that it receives a sufficiently high number of students per year. Here, one may think of 20 students per year. For IM, the yearly inflow is currently 60-70 students, and one may think of 3 tracks.³

¹ For reasons of transparency, the original texts of the General IE Design Choices Document (Van Houtum, 2014) are reprinted, here. However, specific terminology has developed since then, see additional footnotes.

² In the revised IE Master IM the term "Track Core Course" is replaced by "Restricted Specialization Elective".

³ In the revised IE Master IM there will be two regular tracks, that will each contain at least 20 students a year.

A track will have a track leader / coordinator. It is not necessary that tracks get a formal status. Without a formal status, one keeps flexibility.

In any case, it will also be possible for a student to have a 'free program'.⁴ A free program may be used for e.g., excellent students in order to make their programs extra attractive and extra challenging.

Motivation for General IE Design Choice 2

Students may arrive in Eindhoven just before they start with their program (this holds for most students who completed their bachelor at another institute than TU/e). For them, we cannot organize introductory events before their start, while they need to know at their start already which courses to take in their first quarter. With tracks we are able to give that insight. In fact, then they can get that insight already far in advance.

With tracks, we are able to present a more detailed profile of a master. This may also help to attract more students, and/ or it may lead to attracting students whose interests fit better with what we offer.

Tracks can be defined such that they bridge the current borders between capacity groups, and in that case lecturers of multiple capacity groups will be involved. It is preferred that we get such tracks, but this is not a condition for a track.

Consequences of General IE Design Choice 2

The number of students that enters a given track determines also the supervision capacity that is needed for that track. To manage the supervision capacity per track, it is desired that the supervision capacity per involved lecturer is known. It is necessary to find a match between the number of entering students per track and the available capacity.

Lecturers who are involved in two tracks are supposed to denote what their supervision capacity is per track. Such lecturers may also have some flexibility regarding how many students they want to supervise per track per academic year. This flexibility can be used for a better match between demanded supervision capacity per track (determined by the preferences of the students), and the capacity that we can offer.

General IE Design Choice 3

Students will be coupled to mentors in two steps:

- Before the end of the first quarter, a student will be coupled to a track. In this step, we will have a maximum number of students that can be accepted per track,⁵
- Before the end of the second quarter, a student will be coupled to a mentor (a full, associate, or assistant professor), who will also be the main supervisor of the master thesis.

The starting time determines when a student is coupled to a track and to a mentor (and not the planned period for the master thesis work). The whole procedure will be ICT supported, as much as possible.

Motivation for General IE Design Choice 3

In the first quarter, information sessions on the various tracks can be organized. In this way, both students coming from our own bachelor program and students coming from other bachelor programs will be well informed before they have to apply for a track. This gives them an equal playground. The track leader/ co-ordinator will inform students about the important elective courses for that track, so that they can take those courses in their second quarter.⁶

⁴ In the revised IE Master IM the term "Free Program" is replaced by "Special/ Free Track".

⁵ In the revised IE Master IM, it is not expected that the maximum number of students per track is reached, in the near future.

A core course that is only a core course for a given track will be placed in Quarter 2 or in Quarter 4.⁷ And similarly for specialization electives.⁸ In that way, for students starting in September, we avoid that someone is coupled to a given track at the end of his/ her first quarter, while an important course for that track is given in Quarter 1. And, similarly for students starting in February. This potential problem shows that the end of the first quarter is the last possible moment to couple students to tracks.

Ad II: Specific Design Choices at IM Master Program Level

Based on the Graduate School Guidelines, and the General IE Design Choices, the PC-IM has formulated the following specific design choices for the IM master.

Specific IM Design Choice A

The IE Master Innovation Management contains core courses which represent all disciplinary groups contributing to the master program, i.e., innovation, technology entrepreneurship and marketing; information systems; and human performance management.

Specific IM Design Choice B

The IE Master Innovation Management will offer three tracks, two thematic tracks, and one special/free track reserved for honours students, and dual-degree options. The selection of one of these tracks is for all students compulsory.

Specific IM Design Choice C

Each thematic track contains specialization electives (either restricted or recommended) which are typical for that track. One of the recommended electives might be replaced by a free elective. The free track will be populated with specialization electives to be approved by the personal mentor.

Specific IM Design Choice D

Within each track some specialization electives are defined as 'restricted electives' in order to reach the IM Master Program Objectives, see appendix I (table B). According to the Graduate School Guidelines, this choice has to be supported by the Department Board of IE&IS, and approved by the Dean of the Graduate School, in advance.

Specific IM Design Choice E

An international semester cannot be guaranteed in the following circumstances: i) Not enough money available for a student; ii) Not enough positions available at the hosting universities; iii) A homologation program to be completed by the master student; iv) Incompatible rosters between home and hosting universities.

Conclusion

The revision of the IE Master of Science Innovation Management will be based on the guidelines of TU/e's Graduate School, the general GP-IE design choices, and some additional IM specific design choices based on the Program Objectives, see Appendix I.

⁶ Because the revised IE Master IM only contains two regular tracks, a track leader/ co-ordinator is not needed.

⁷ In the revised IE Master IM the term "Track Core Course" is replaced by "Restricted Specialization Elective".

⁸ In the revised IE Master IM the term "Specialization Elective" is further refined into "Restricted Specialization Elective" and "Recommended Specialization Elective".

The Revised IE Master of Science Innovation Management

The above-mentioned design choices resulted in the following outline of the revised IE Master Innovation Management, see Figure 1.

Year 1	<ul style="list-style-type: none"> • 50/ 50% Core courses and electives, i.e., 30 ECTS each: <ul style="list-style-type: none"> ✓ 6 x 5 ECTS core courses focus on main Innovation Management content and methodology ✓ Similar share of specialisation and free electives, i.e. 30 ECTS
Year 2	<ul style="list-style-type: none"> • International Semester, i.e., 15 - 30 ECTS: <ul style="list-style-type: none"> ✓ Minimum of 3 x 5 ECTS free elective courses at a foreign university, or ✓ Maximum of 6 x 5 ECTS free elective courses at TU/e. This may include a literature study for the master thesis • Master thesis: 30 ECTS <ul style="list-style-type: none"> ✓ Master thesis: (30 ECTS, research proposal included) • Opportunities for a honours track in design or research (20 ECTS)

Figure 1. Outline of the Revised IE Master Innovation Management

Core Courses in the Revised IE Master Innovation Management

In the revised IE Master Innovation Management a maximum of 30 ECTS is available for core courses: three core courses delivering content and three core courses with a focus on methods, see Figure 2. For the link with the IM Program Objectives, see Appendix I, Table A.

<ul style="list-style-type: none"> • Management of Product Development • Marketing and Innovation • Human Aspects of Innovation 	Content
<ul style="list-style-type: none"> • Multivariate Statistics • Business Intelligence • Design Science Methodology 	Method

Figure 2. Core Courses in the Revised IE Master Innovation Management

Core Courses IM: Content

1ZM16 Management of Product Development	5 ECTS
1ZM11 Marketing and Innovation	5 ECTS
1JM06 Human Aspects of Innovation	5 ECTS

Core Courses IM: Method

1ZM31 Multivariate Statistics	5 ECTS
1BM56 Business Intelligence	5 ECTS
1ZM50 Design Science Methodology	5 ECTS

Tracks in the Revised IE Master Innovation Management

The revised IE Master Innovation Management provides three tracks:

- Track 1: Business and Product Creation,
- Track 2: Managing Innovation Processes,
- Track 3: Special Track (honours programs in research and design; dual-degree options).

Track 1: Business and Product Creation

This track emphasizes the front-end of the innovation process and teaches students the essence of creative idea generation, opportunity identification, entrepreneurial actions, and initiating breakthrough projects. For more details, see Appendix II.

Track 2: Managing Innovation Processes

In this track, the focus will be on continuous improvement, planning the innovation process, analysing the market, managing supporting processes such as IT and human capital, securing efficiency and milestones, larger developments, and firms in more stable markets. For more details, see Appendix II.

Track 3: Special/ Free Track

This track is especially created for excellent (honours) students who want to design their own master program, in close collaboration with the personal mentor, to be approved by the Director GP-IE.

Specialization Electives in the Revised IE Master Innovation Management

The tracks are populated with specialization electives (all one-quarter courses), see Figure 3.



Figure 3. Tracks and Specialization Electives in the Revised IE Master Innovation Management
 One of the Recommended Specialization Electives might be exchanged by a Free Elective, to further accommodate specific personal ambitions of the student.

IM Track 1, Business and Product Creation, contains the following Specialization Electives:

IM Track 1, Restricted Specialization Elective

1ZM100 Design project for business and product creation 5 ECTS

IM Track 1, Recommended Specialization Electives - 5 out of 9 *)

1ZM20 Technology entrepreneurship 5 ECTS

1ZM90 Open innovation 5 ECTS

1ZM70	Entrepreneurial finance	5 ECTS
1ZM120	Entrepreneurial marketing	5 ECTS
1ZM60	Selling new products	5 ECTS
1ZM65	System dynamics	5 ECTS
1BM20	Software requirements management	5 ECTS
1BM70	Innovating healthcare through business networks	5 ECTS
1JM30	Managing team dynamics and team performance	5 ECTS

IM Track 2, Managing innovation processes, contains the following specialization electives:

IM Track 2, Restricted Specialization Elective

1ZM110	Design project for managing innovation processes	5 ECTS
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IM Track 2, Recommended Specialization Electives - 5 out of 9 *)

1ZM40	Strategy & technology management	5 ECTS
1ZM65	System dynamics	5 ECTS
1CM15	Project and process management	5 ECTS
1ZM35	Strategic sourcing & supply management	5 ECTS
1ZM55	Service engineering & marketing	5 ECTS
1ZM60	Selling new products	5 ECTS
1BM05	Business process management	5 ECTS
1JM30	Managing team dynamics and team performance	5 ECTS
1BM65	IT governance	5 ECTS

IM Track 3, Special / Free Track (IE honours programs in research and design, dual-degree options):

All specialization electives to be determined in close collaboration with the personal mentor, and to be approved by the Director GP-IE.

***)** *One of the five Recommended Specialization Electives might be exchanged by a Free Elective. This is to further accommodate specific personal ambitions of the student. Additional Free Electives are to be selected in the first semester of the second year. If a (full) international semester is not possible, these additional Free Electives can be taken from TU/e's Graduate School, or another Dutch (technical) university. However, the master program must form a coherent whole, and all specialization elective courses must be taught on master level.*

Since the revised IE Master Program Innovation Management contains only a limited number of tracks, and most student' choices will be supported by ICT, track leaders/ co-ordinators are not considered a necessity.

Revised IE Master Innovation Management: Choices for Students

According to the PC-IM, there is enough room for choices in the revised IE Master Innovation Management: 14 of the 18 IM master courses = 78% are selected by the student; 7 of those 14 elective courses = 50% are *free* electives). Students have at least five types of choices:

- Choice 1: Innovation Management thematic tracks (and one Restricted Specialization Elective),
- Choice 2: Additional elective courses within the tracks (Recommended Specialization Electives),
- Choice 3: Host university for the international semester,
- Choice 4: Free elective courses at home/ foreign universities (Free Electives),
- Choice 5: Theme and mentor for the master thesis.

Revised IE Master Innovation Management: Arguments to Define Restricted Specialization Electives within the IM Tracks

The IM master tracks sketch clear profiles to support the thematic choices of the students. A track is carefully described, including keywords, examples, job market positions etc., see Appendix II.

In order to fit best, each track needs different Restricted Specialization Electives, and Recommended Specialization Electives. For the Restricted Specialization Electives, the Guidelines for Revision of TU/e Graduate School Master's Programs (2014) prescribes that they should add directly to the IM program objectives ('learning outcomes'), and are to be approved by the Dean Graduate School, the Director Graduate Program IE, and the departmental board of IE&IS.

The following details show how the Restricted Specialization Electives relate to the IM Program Objectives, see also Appendix I, Table B.

IM Track 1, Restricted Specialization Electives versus IM Program Objectives

1ZM100 Design project for business and product creation: Scientific Disciplines: Knowledge & Understanding; Doing Research: Applying Knowledge & Understanding; Designing: Applying Knowledge & Understanding; Making Judgements; Learning Skills: Developing learning skills; Co-operating & Communicating: Communication; Social context: Making judgements.

IM Track 2, Restricted Specialization Electives versus IM Program Objectives

1ZM110 Design project for managing innovation processes: Scientific Disciplines: Knowledge & Understanding; Doing Research: Applying Knowledge & Understanding; Designing: Applying Knowledge & Understanding; Making Judgements; Learning Skills: Developing learning skills; Co-operating & Communicating: Communication; Social context: Making judgements.

References

- Executive Board TU/e (2014). *Guidelines for revision of TU/e Graduate School master's programs*. Eindhoven: Technische Universiteit, 19 September 2014.
- Fransoo, J., Jansens, P., Knoop, J., Lange, R. de., Leeuwarden, J. van, Lemmens, L., & Bergmans, J. (2014). *Position paper: Revision of Graduate School master's programs*. Eindhoven: TU/e, version 4, February 2014.
- Houtum, G.-J. van (2014). Revision master programs IM and OML: Decisions for the rough design phase. Eindhoven: TU/e Graduate Program Industrial Engineering, 31 August 2014.
- Nijssen, E.J., Resing-Sassen, S.A.E., Gevers, J.M.P., & Reymen, I.M.M.J. (2013). *MEMO: 2014-2015 Enhancement of Program IM Master*. Eindhoven: TU/e, 31 October.
- Programmacommissie IM (2014). *Voorstellen herziening master Innovation Management (IM)*. Eindhoven: TU/e, Department of IE&IS, 12 Mei 2014.

Appendix I: Program Objectives IE Master of Science Innovation Management

The IE Master of Science Innovation Management has defined the following six program objectives:

1. Scientific disciplines

Graduates are engineers with state-of-the art scientific knowledge of the design, behavior, planning and enhancing performance of innovation processes. For this purpose graduates have multidisciplinary knowledge particularly organizational, technical and economical.

2. Doing research, scientific approach

Graduates have research skills to independently conduct studies meeting academic standards.

3. Designing

Graduate are well-capable of modeling and (re)designing a complex business process, based on the results of a study, including specifications and required information.

4. Learning skills

Graduates are able to reflect and creatively solve problems. Students understand their own (and the organizational) learning process and have skills in this domain.

5. Co-operating & communicating

Graduates are able to communicate clearly and unambiguously both in industry and in academia, with non-specialists and specialists in the domain. Therefore, they have adequate social and communication skills. Graduates are also capable of operating independently as well as in (multidisciplinary) teams.

6. Social context

Graduates are aware of the social context they work in and social impact of their work.

The program objectives of the IE Master of Science Innovation Management have been scored on the so-called **Dublin Descriptors**. The Dublin Descriptors are the cycle descriptors (or 'level descriptors') presented in 2003 and adopted in 2005 as the Qualifications Framework of the European Higher Education Area. They offer generic statements of typical expectations of achievements and abilities associated with awards that represent the end of each of a (Bologna) cycle or level. The descriptors are phrased in terms of competence levels, not learning outcomes, and they enable to distinguish in a broad and general manner between the different cycles. A level descriptor includes the following five components:

- Knowledge and understanding,
- Applying knowledge and understanding,
- Making judgements,
- Communication,
- Lifelong learning skills.

A Master's degree is the second-level higher education award (Second cycle - EQF Level 7). It refers to the second cycle in the Qualifications Framework of the European Higher Education Area. The degree usually requires a minimum of 90 ECTS, of which at least 60 ECTS at Master's level.

Reference:

Bologna Follow-Up Group (2005). *Framework for Qualifications of the European Higher Education Area*. Copenhagen: Ministry of Science, Technology and Innovation, p. 9.

http://ecahe.eu/w/index.php/Dublin_Descriptors

http://www.nvao.net/page/downloads/Dublin_Descriptoren.pdf

http://www.ond.vlaanderen.be/hogeronderwijs/bologna/documents/050218_QF_EHEA.pdf

Appendix I: Program Objectives IE Master of Science Innovation Management

IE Master of Innovation Management, Core Courses

Self-evaluation categories	Dublin indicator					TU/e's IE MSc IM
	Knowledge & Understanding	Applying Knowledge & Understanding	Making judgements	Communication	Develop learning skills	
Scientific disciplines	<u>1JM06</u> <u>1ZM11</u> <u>1ZM16</u> <u>1ZM31</u> <u>1BM56</u>	<u>1JM06</u> <u>1ZM11</u> <u>1ZM16</u> <u>1ZM31</u> <u>1BM56</u>	<u>1JM06</u> <u>1ZM11</u> <u>1ZM16</u> <u>1ZM31</u>	<u>1JM06</u>	*)	Graduates are engineers with state-of-the-art scientific knowledge of the design, behavior, planning and enhancing performance of innovation processes. For this purpose graduates have multi-disciplinary knowledge particularly organizational, technical and economical.
Doing research scientific approach	<u>1ZM31</u> <u>1ZM50</u> <u>1BM56</u>	<u>1ZM31</u> <u>1ZM50</u> <u>1BM56</u>	<u>1JM06</u> <u>1ZM11</u> <u>1ZM16</u> <u>1ZM31</u> <u>1ZM50</u> <u>1BM56</u>	<u>1JM06</u> <u>1ZM31</u> <u>1ZM50</u>	<u>1ZM31</u> <u>1ZM50</u>	Graduates have research skills to independently conduct studies meeting academic standards.
Designing	<u>1ZM31</u> <u>1ZM50</u> <u>1BM56</u>	<u>1ZM50</u> <u>1BM56</u>	<u>1ZM50</u> <u>1BM56</u>	<u>1ZM50</u> <u>1BM56</u>	<u>1ZM50</u>	Graduate are well-capable of modeling and (re)designing a complex business process, based on the results of a study, including specifications and required information.
Learning skills	<u>1ZM11</u>	<u>1ZM11</u> <u>1ZM16</u> <u>1BM56</u>	<u>1JM06</u> <u>1ZM11</u> <u>1ZM16</u> <u>1ZM31</u>	<u>1ZM16</u> <u>1ZM31</u> <u>1ZM50</u>	<u>1JM06</u> <u>1ZM11</u> <u>1ZM16</u> <u>1ZM31</u> <u>1BM56</u>	Graduates are able to reflect and creatively solve problems. Students understand their own (and the organizational) learning process and have skills in this domain.
Co-operating & communicating	<u>1ZM11</u> <u>1ZM16</u>	<u>1ZM11</u> <u>1ZM16</u> <u>1ZM31</u>	<u>1ZM11</u> <u>1ZM16</u>	<u>1JM06</u> <u>1ZM11</u> <u>1ZM16</u> <u>1ZM31</u> <u>1ZM50</u> <u>1BM56</u>	<u>1JM06</u> <u>1ZM11</u> <u>1ZM16</u>	Graduates are able to communicate clearly and unambiguously both in industry and in academia, with non-specialists and specialists in the domain. Therefore, they have adequate social and communication skills. Graduates are also capable of operating independently as well as in (multidisciplinary) teams.
Social context	<u>1ZM11</u> <u>1ZM16</u> <u>1ZM31</u>	<u>1ZM11</u> <u>1ZM16</u> <u>1ZM31</u>	<u>1ZM11</u> <u>1ZM16</u>	<u>1ZM11</u> <u>1ZM16</u> <u>1ZM50</u> <u>1BM56</u>	*)	Graduates are aware of the social context they work in and social impact of their work.

Table A: Core Courses in relation to IM Program Objectives

Adapted from: Nijssen *et al.* (2013)

*) The personal mentor provides a role model for developing lifelong learning skills

Important note: The Revised IE Master Innovation Management will keep the same governmental registration license: the supplied CROHO number will not change! Therefore, the Revised IE Master Innovation Management must obey the same program objectives as the current IM master program, which will be periodically evaluated by an external accreditation committee.

The IM Program Committee has carefully checked the core of the Revised IE Master Innovation Management against the original program objectives of the Innovation Management master.

Reference: http://www.duo.nl/zakelijk/ho/croho/registratie_in_het_croho.asp

Appendix I: Program Objectives IE Master of Science Innovation Management

IE Master of Innovation Management, Restricted Specialization Electives

Self-evaluation categories	Dublin indicator					TU/e's IE MSc IM
	Knowledge & Understanding	Applying Knowledge & Understanding	Making judgements	Communication	Develop learning skills	
Scientific disciplines					*)	Graduates are engineers with state-of-the-art scientific knowledge of the design, behavior, planning and enhancing performance of innovation processes. For this purpose graduates have multidisciplinary knowledge particularly organizational, technical and economical.
Doing research scientific approach		<u>1ZM100</u> <u>1ZM110</u>				Graduates have research skills to independently conduct studies meeting academic standards.
Designing		<u>1ZM100</u> <u>1ZM110</u>	<u>1ZM100</u> <u>1ZM110</u>			Graduate are well-capable of modeling and (re)designing a complex business process, based on the results of a study, including specifications and required information.
Learning skills					<u>1ZM100</u> <u>1ZM110</u>	Graduates are able to reflect and creatively solve problems. Students understand their own (and the organizational) learning process and have skills in this domain.
Co-operating & communicating				<u>1ZM100</u> <u>1ZM110</u>		Graduates are able to communicate clearly and unambiguously both in industry and in academia, with non-specialists and specialists in the domain. Therefore, they have adequate social and communication skills. Graduates are also capable of operating independently as well as in (multidisciplinary) teams.
Social context			<u>1ZM100</u> <u>1ZM110</u>		*)	Graduates are aware of the social context they work in and social impact of their work.

Table B: Restricted Specialization Electives in relation to IM Program Objectives

Adapted from: Nijssen *et al.* (2013)

*) The personal mentor provides a role model for developing lifelong learning skills

Important note: The Revised IE Master Innovation Management will keep the same governmental registration license: the supplied CROHO number will not change! Therefore, the Revised IE Master Innovation Management must obey the same program objectives as the current IM master program, which will be periodically evaluated by an external accreditation committee.

The IM Program Committee has carefully checked the restricted specialization electives of the Revised IE Master Innovation Management against the original program objectives of the Innovation Management master (see for approval by the Board of IE&IS, appendix III).

Reference: http://www.duo.nl/zakelijk/ho/croho/registratie_in_het_croho.asp

Appendix II: Details about Tracks IE MSc Innovation Management

Based on the results of two lunch meetings with the lecturers of the Innovation Management master, the IM Program Committee has discussed a couple of possibilities, and proposes three new IM tracks: two thematic tracks, and one special/ free track. The new IM tracks are described using a number of characteristics: key words, examples, job market positions, capacity group transcending themes, and domains.

IM Track 1: Business and Product Creation

Description: Starting something new is difficult. It requires creativity, breaking free from the past, and risk-seeking. At the same time, firms in search of product and service innovations as well as entrepreneurs looking to establish new ventures, need structured models and validated techniques to aid decision-making. This track emphasizes the front-end of the innovation process and teaches students the essence of creative idea generation, opportunity identification, entrepreneurial actions, and initiating breakthrough projects. In the discussion of the product development stages following this front-end of the innovation process, the focus will be on managing radically new products, exploring new contexts, and being successful in marketing innovations to new and emerging markets.

Key Words: Radically new products, entrepreneurial, creative, idea generation, risk-seeking, breakthrough, exploration, new business, opportunity identification

Examples: new application areas ('smart cities', 'smart houses', 'smart mobility', 'smart energy', healthcare), new business models, new (societal) problems, innovation in health-care, new media, e-business, internet of things (e.g., telemetry); high-start-up; micro business

Job Market Positions: specified for different types of companies

Multinational/ transnational company: Business engineer; sales advisor; innovation excellence advisor; project and program manager

Consultant for multinational/ transnational company: Business analyst strategy; junior project manager

Consultant for SME: Strategy consultant; business developer; innovation marketer; business creation manager

Small company: CEO & founder; owner; managing director; director business development; head of ecosystem; technical project manager

Capacity Group Transcending Themes: Innovation & intellectual property, Leadership & 'crowd sourcing', Innovation & entrepreneurship

Domains: Emerging new markets, new services, also in healthcare

IM Track 2: Managing Innovation Processes

Description: Although companies develop many ideas for new products and services, few of these ideas transform into products, and many new products fail once released on the market. To be more successful in the process of managing innovations throughout the development process and to successfully sell them to the market, a thorough understanding of the dynamics within the firm and in the marketplace is needed. This means that knowledge of business strategies and how they aid the development of innovative capabilities is essential. Also frameworks and methods to analyze the market potential of a product or service, to gather and act on market information, and to cooperate and innovate with supply chain partners, aid in decision-making in the innovation process. In this track, the focus will be on continuous improvement, planning the innovation process, analyzing the

market, managing supporting processes such as IT and human capital, securing efficiency and milestones, larger developments, and firms in more stable markets.

Key Words: Strategy, planning, analyzing, supporting processes, efficiency, milestones, big data, large scale, exploitation, stable contexts

Examples: Sales analysis, marketing research, process management, product lifecycle management, big data intelligence, knowledge management, product and process redesign, customer sentiment analysis, product and process quality and reliability

Job Market Positions: specified for different types of companies

Multinational/ transnational company: Manager innovation and subsidies; manager R&D department; manager customer service center; manager back-office sales; digital service manager; executive support CCO; project manager; project engineer; planning engineer; demand planner; strategic buyer; sourcing manager; supplier relationship manager; purchasing and supply chain manager; change manager; management trainee.

Consultant for multinational/ transnational company: Business analyst; junior project manager.

Capacity Group Transcending Themes: New product development & leadership: marketing & knowledge management, innovation & supply chain, leadership & information systems

Domains: Existing markets, services, also in healthcare

IM Track 3: Special/ Free Track

Description: This track is especially created for excellent (honours) students who want to design their own master program, in close collaboration with the personal mentor, to be approved by the Director GP-IE.

Key words: choice of electives is to the discretion of the student, following the advice of the personal mentor. The full program must form a coherent whole, and all courses should be at least at master level.

Examples: PhD, PDEng, dual-degree options ******)

Job Market Positions: academic researcher, management consultant

Themes: dependent on the personal mentor, and the BETA research program

Domains: dependent on the personal mentor, and the BETA research program

******) In the revised IE Master of Science IM there are possibilities for dual-degree master studies - for instance, combining Innovation Management and Innovation Sciences. Students who want to opt for dual degrees must contact the study advisors of the respective Master Programs, for any further information.

Appendix III: Decisionmaking at GP-IE/ Board-IE&IS/ OC-IE /Capgroup Levels

21 November 2014

The Director Graduate Program IE has confirmed that the revised IE Master of Science Innovation Management is in full accordance with the Guidelines for Revision of TU/e Graduate School Master's Programs (Executive Board TU/e, 2014), and the General Design Choices developed and agreed at the level of the Graduate Program Industrial Engineering (Van Houtum, 2014).

20 November 2014

In her meeting of 20 November 2014 the Departmental Board of IE&IS has approved the Restricted Specialization Electives of the revised IE Master of Science Innovation Management.

15 November 2014

Geachte opleidingsdirecteur,

De OC-TBdk heeft in haar 78e vergadering, d.d. 13-11-2014, het document "Revision of Industrial Engineering Master Innovation Management" besproken.

Er is veel waardering voor de gemaakte keuzes in het herontwerp alsmede voor de heldere en gestructureerde manier van verslaglegging. De leden van de commissie zijn met name positief gestemd over de structuur van basisvakken (core courses) met daarbij richtinggevende tracks die studenten helpen in hun verdere keuzes, maar toch genoeg ruimte en flexibiliteit laten voor specialisatie. De OC-TBdk adviseert dan ook positief over dit voorstel tot revisie van de Innovation Management master.

Een enkele suggestie die de commissie nog wil doen, is om in het document ook de basisvakken te relateren aan de eindtermen van de opleiding middels een tabel, analoog aan de huidige "Table A".

Met vriendelijke groet,

Jeroen Schepers

Voorzitter OC-TBdk

The suggestion of the OC-IE was implemented as follows:

- Core Courses IM in relation to IM Program Objectives: see Appendix I, Table A;
- Restricted Specialization Electives in relation to IM Program Objectives: was Appendix I, Table A, now has become Appendix I, Table B.

7 November 2014

The revised IE Master of Science Innovation Management program was presented to, and supported by all participating IE Capacity Groups: i.e., Human Performance Management (HPM); Information Systems (IS); and Innovation, Technology Entrepreneurship & Marketing (ITEM).

Postscript, 7 January 2015

The initial proposal was sent to the Dean of the Graduate School on 26 November 2014. Based on the evaluation of the core team of the Graduate School the number of restricted electives was reduced from three to only one. The adapted proposal was sent on 8 January 2015.

End of Document